Superstreets, A Learning Process

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Topics

- Why Unconventional Designs
- Rural Areas
- Urban Areas
- Next Steps

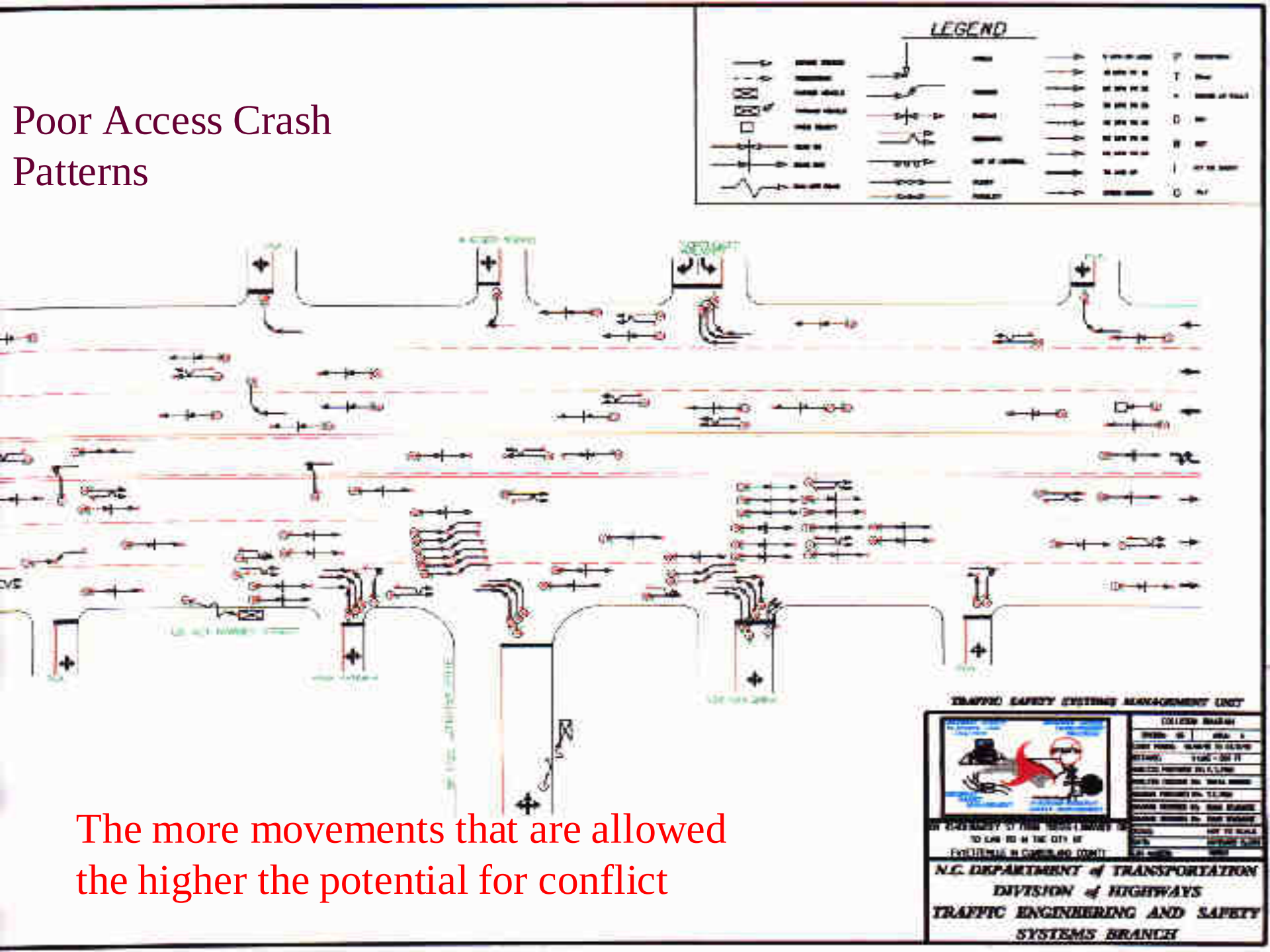
Growing Problem on Arterials

- Safety is a top concern
- There is a continual growing demand
- Conventional solutions are becoming exhausted
- Bypasses are limited due to a wide array of constraints

Safety Issues

Poorly Managed Facilities are Often Retrofitted for Safety Reasons

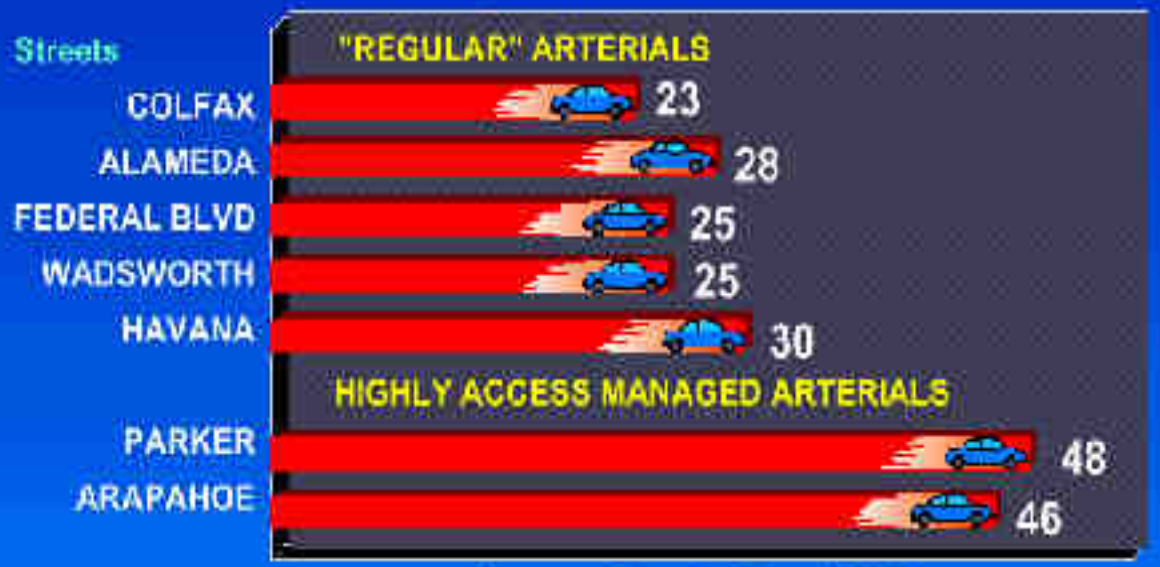
Poor Access Crash Patterns



The more movements that are allowed the higher the potential for conflict

INCREASED CAPACITY

Effects of Access Management on Travel Speed in the P.M. Peak



Average Running Speed MPH

* Source: "Colorado Access Control Demonstration Project" 1995

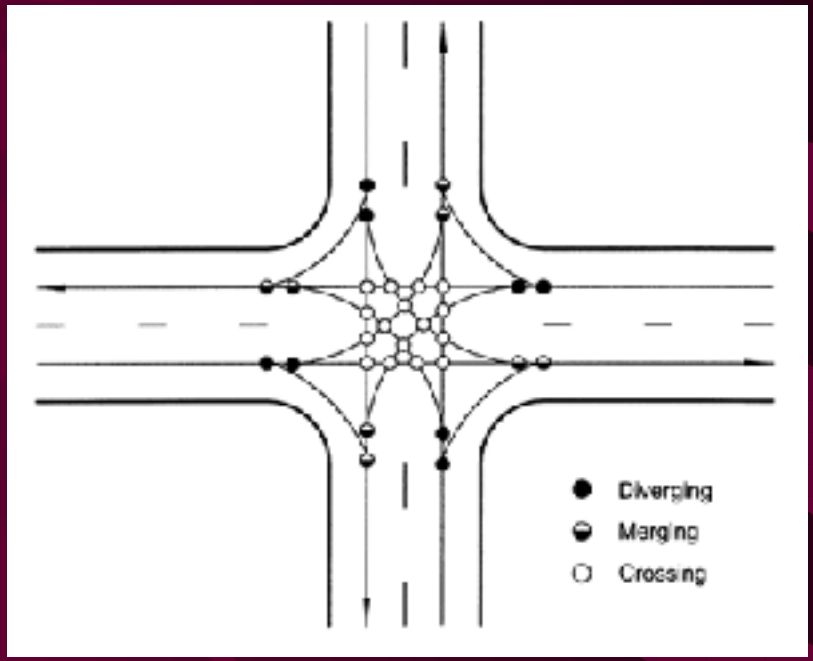
Unrestricted Movements Result in Reduced Capacity as Well as Safety

Median Facilities

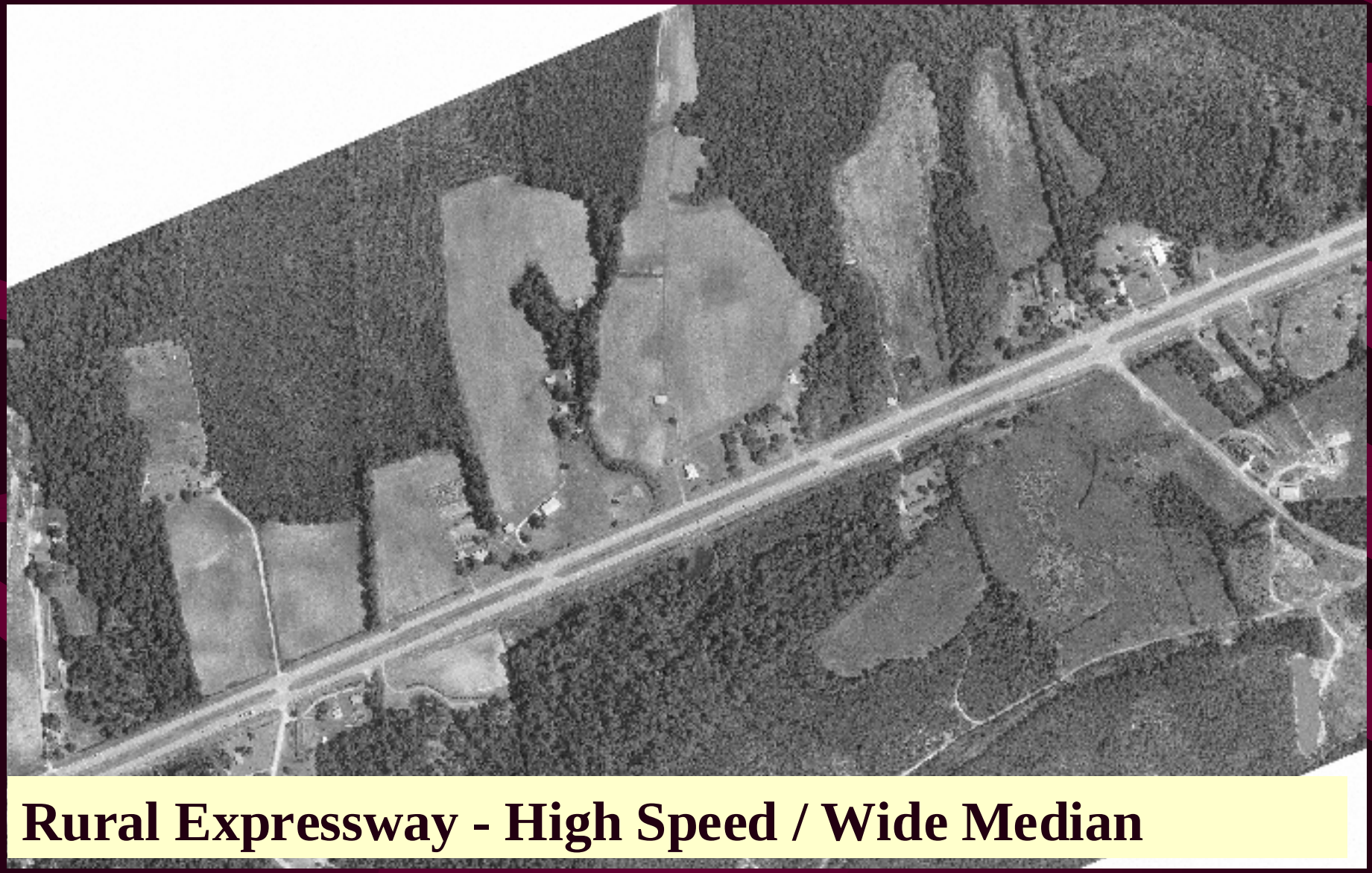
Median facilities help reduce the number of conflict points

Is a Median Enough?

- Two-way median opening
- 32 conflict points
- Potential for delay and collision at each
- Modest demand requires a “four-phase” signal.



Rural Areas



Rural Expressway - High Speed / Wide Median

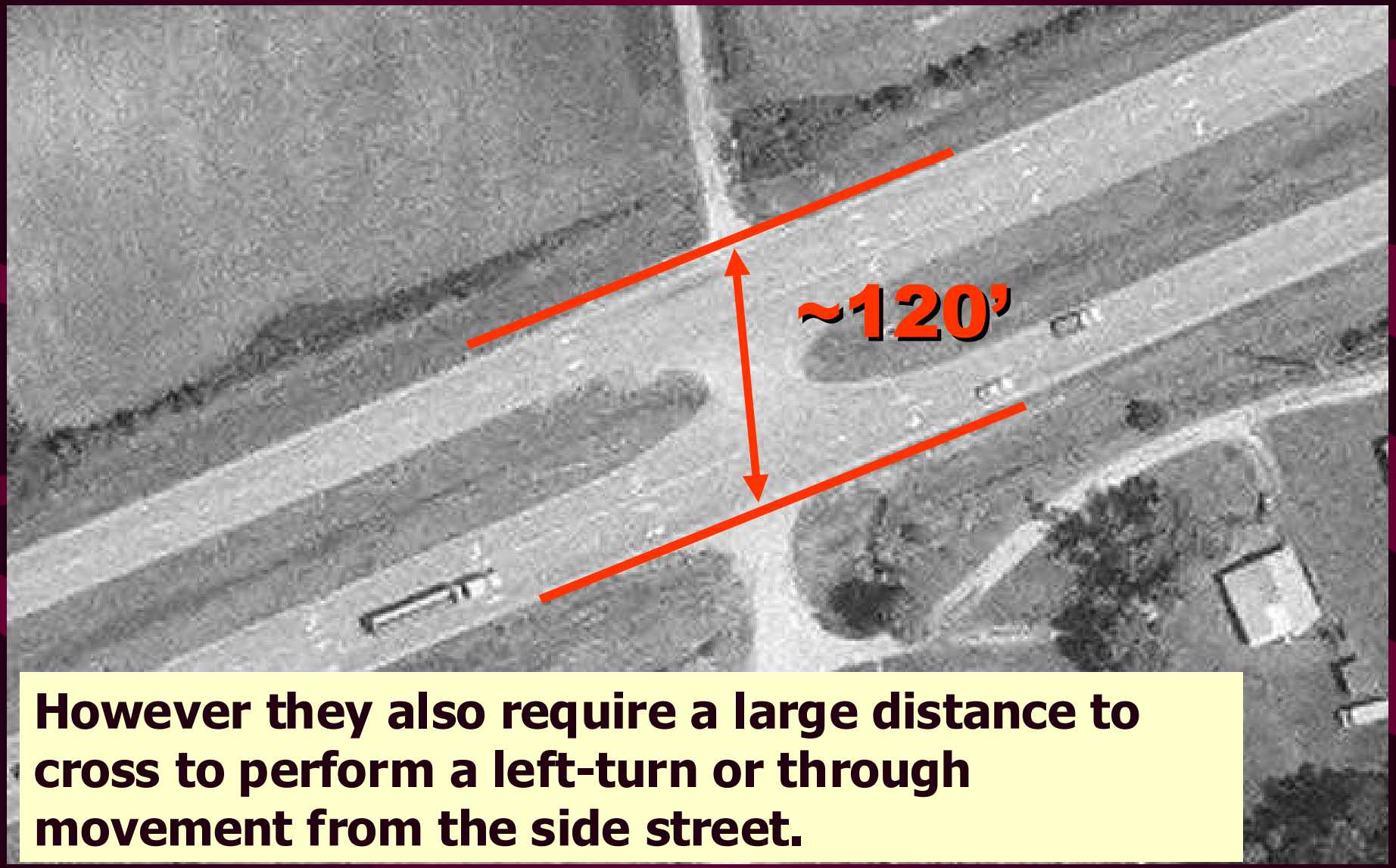
Rural Areas

- Rural Area Concerns are typical safety related versus capacity related
  - Wide Medians
  - High Speeds
  - Sight Distance Too Good???
  - Poor Driving Decisions

Rural Expressway - Full Movement Median Crossover

Median allows for good separation of high speed vehicles traveling in opposing directions

Long distance to cross main corridor may take more time than the gap motorists are able to choose

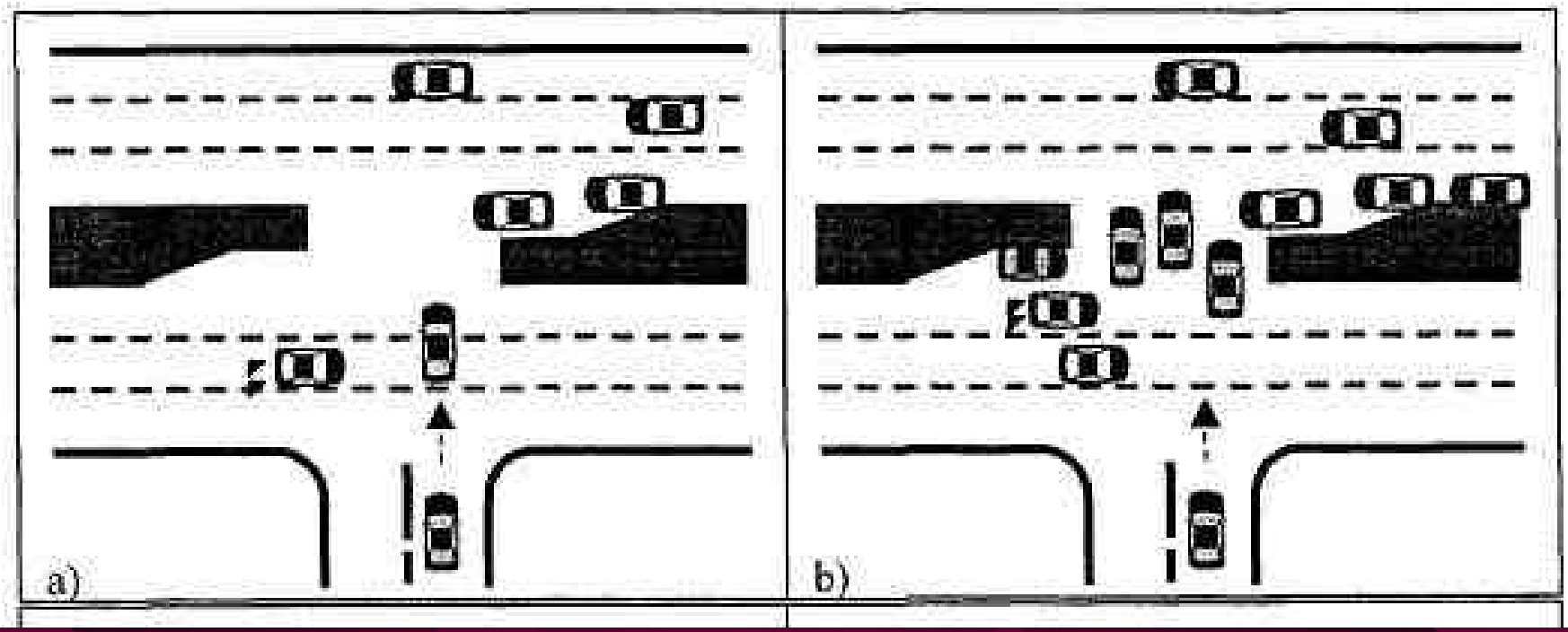


However they also require a large distance to cross to perform a left-turn or through movement from the side street.

Large Crossing Distance

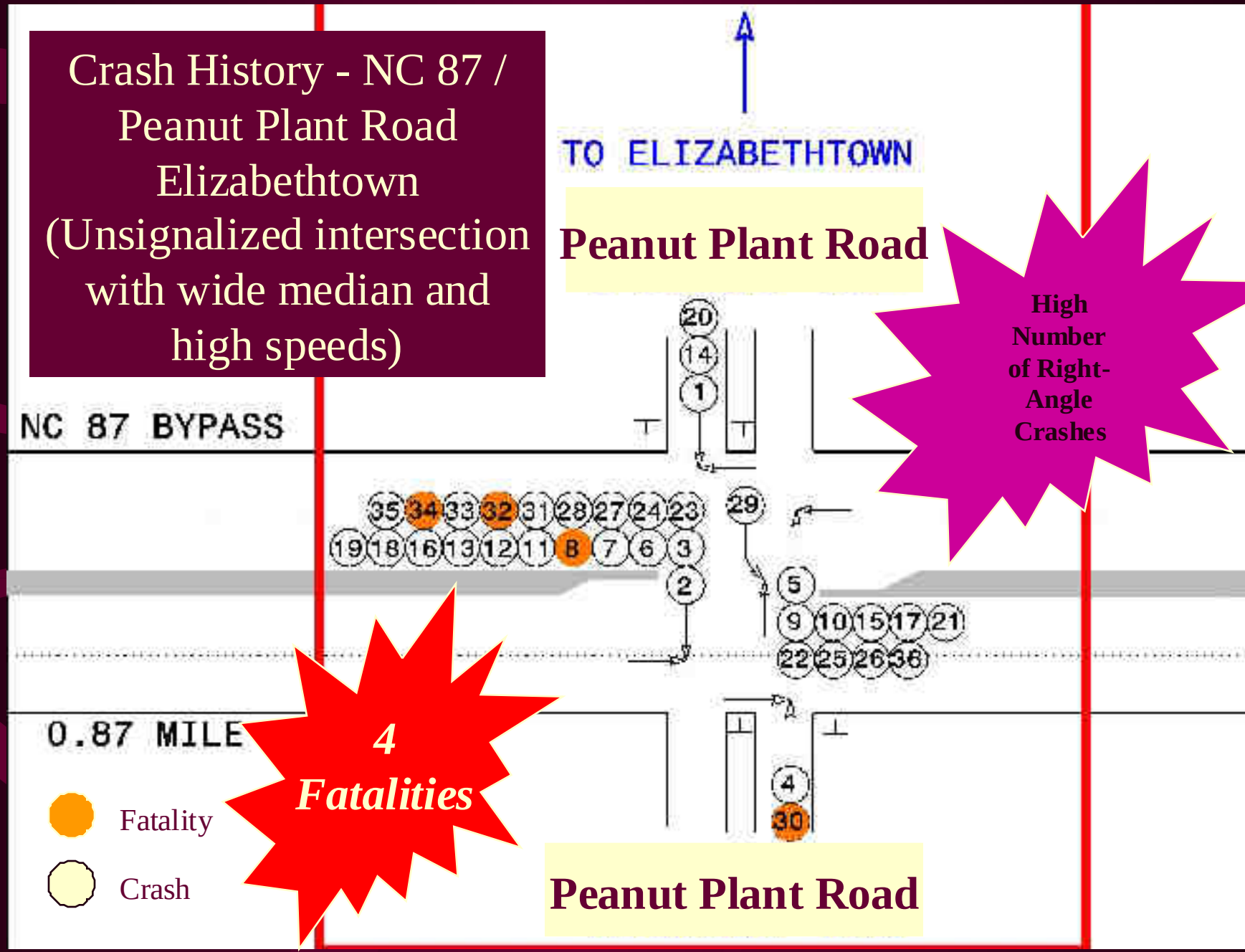
- Requires large amounts of sight distance
- Due to speed on the main street, also requires very quick decision making
- Can result in misjudgment of crossing time and opposing vehicle arrival time
- Right angle crashes can be prevalent which are some of the more severe crashes

Large Median Openings Allow for Stacking in the Median which can severely limit sight distance



Drivers do not always follow the rules of the road.

Crash History - NC 87 / Peanut Plant Road Elizabethtown (Unsignalized intersection with wide median and high speeds)

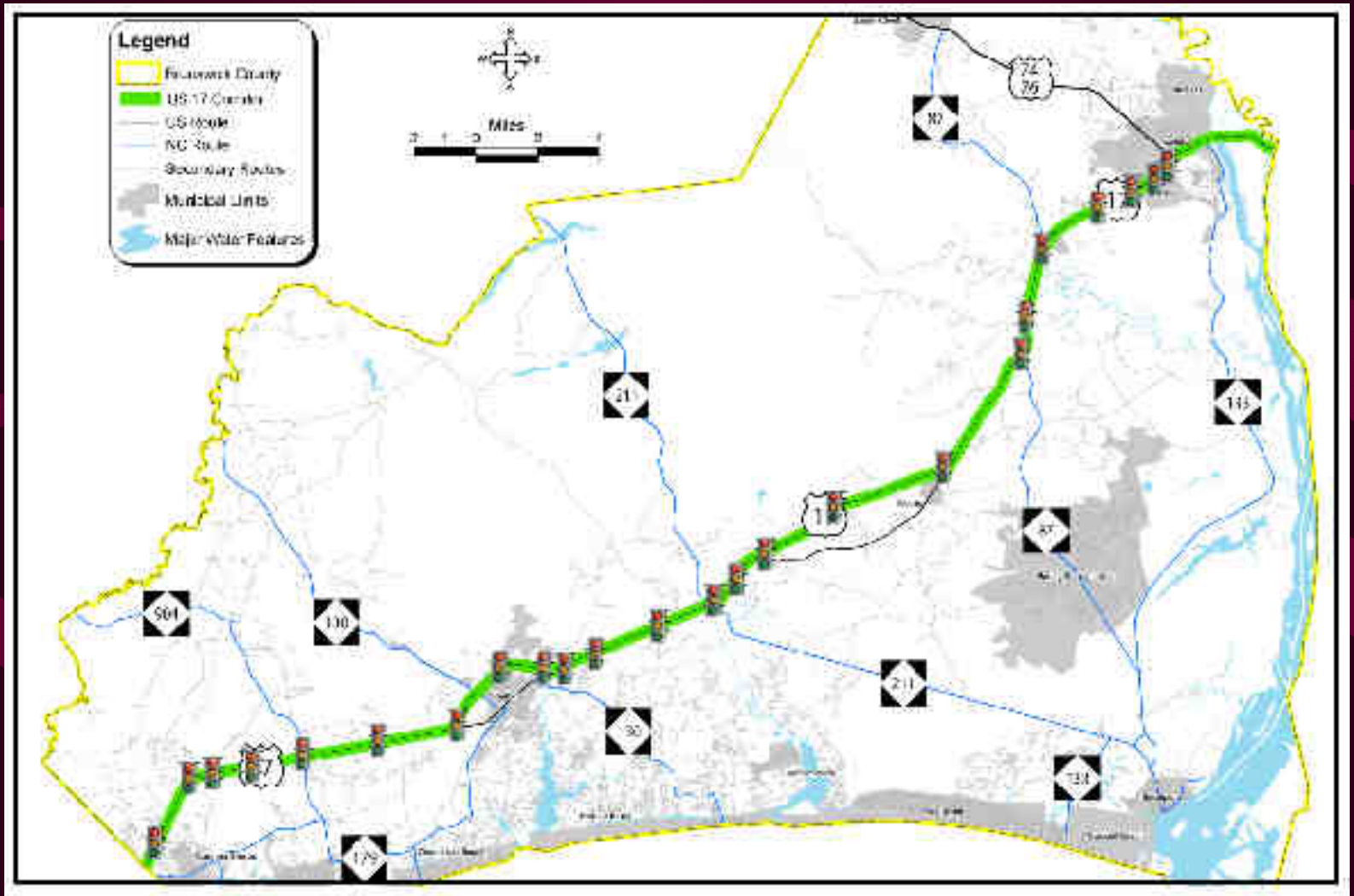


High Number of Right-Angle Crashes

4 Fatalities

Traditional Solution - Install Traffic Signal

US 17 Signals

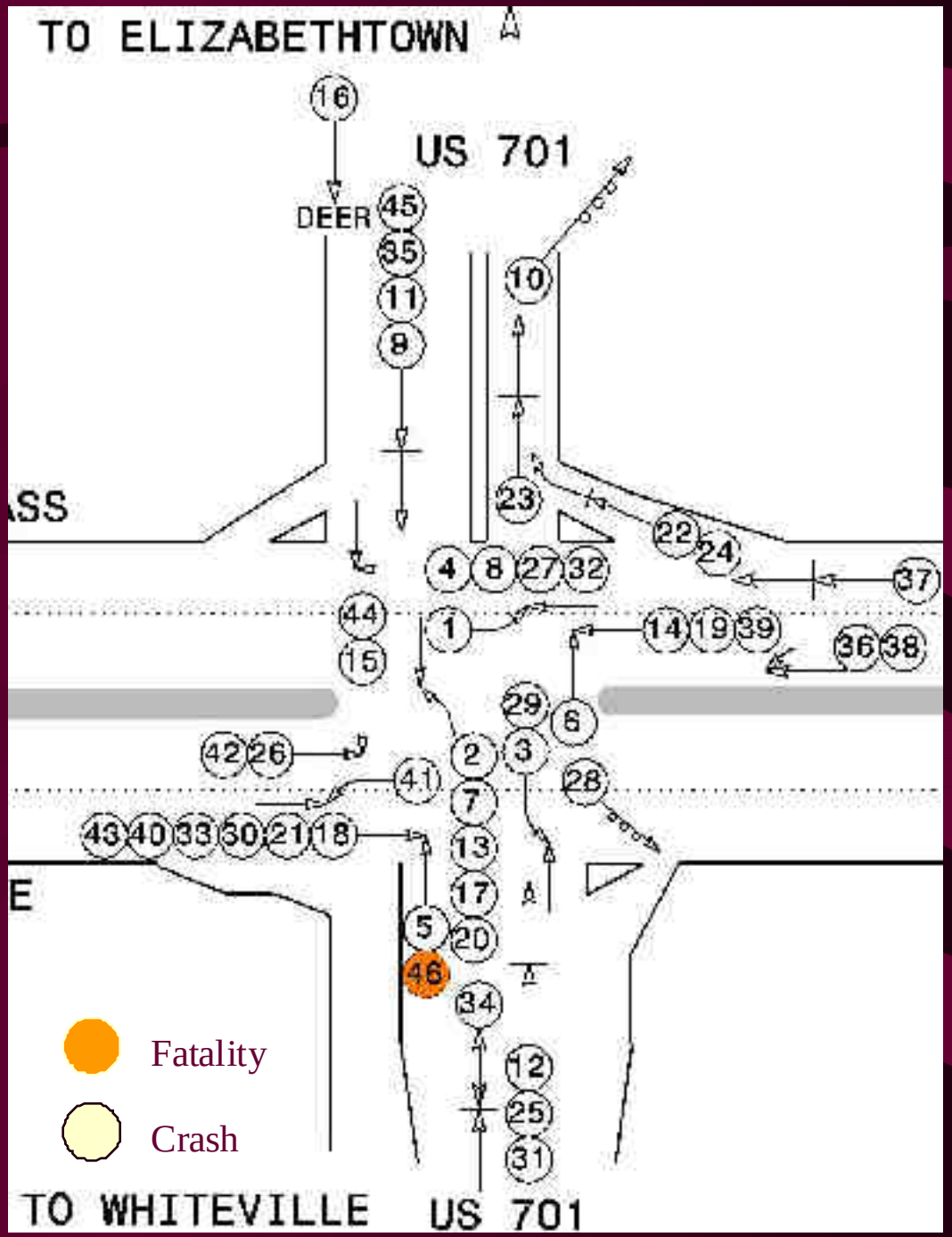


Signalized Intersections

Multi-phase signals can create even more confusion, delay and frustration.

Crash History - NC 87 / US 701 Elizabethtown Signalized intersection with wide median and high speeds

Traffic signals don't always solve the problem, they may just create a different problem. The potential conflicts still exist.

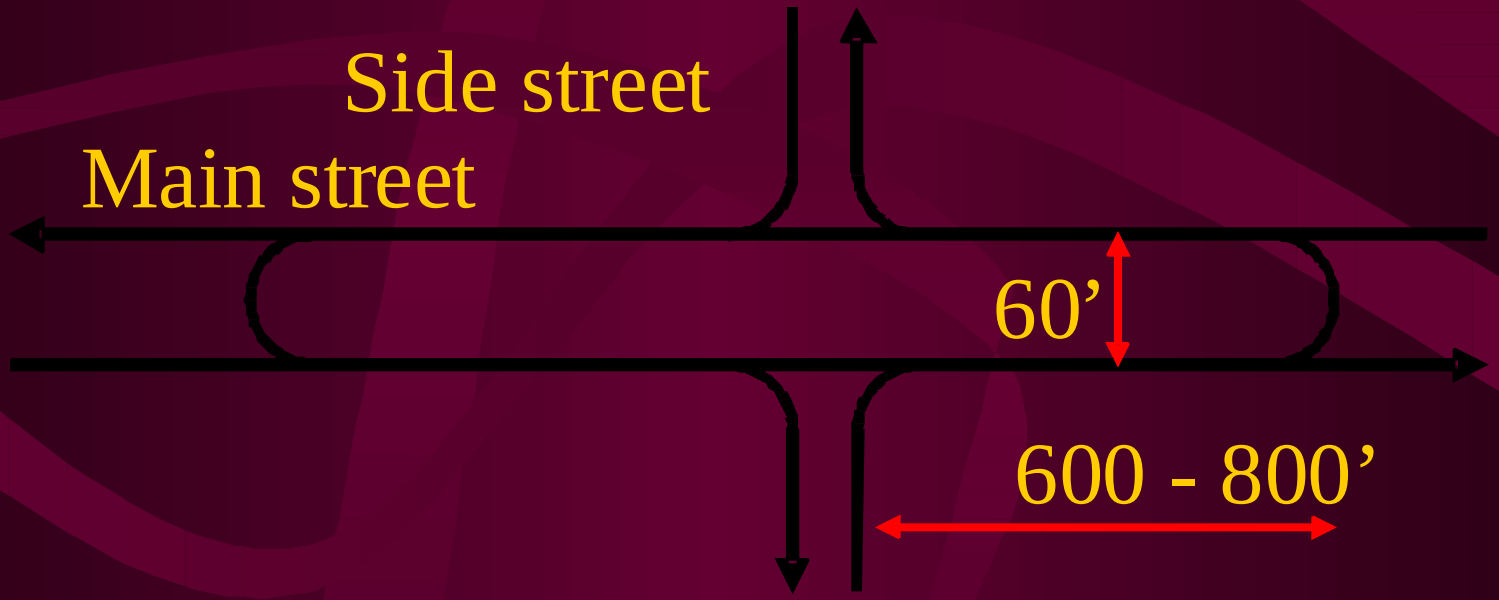


Install an Interchange?

Interchanges are not always feasible due to costs, impacts, and traffic volumes

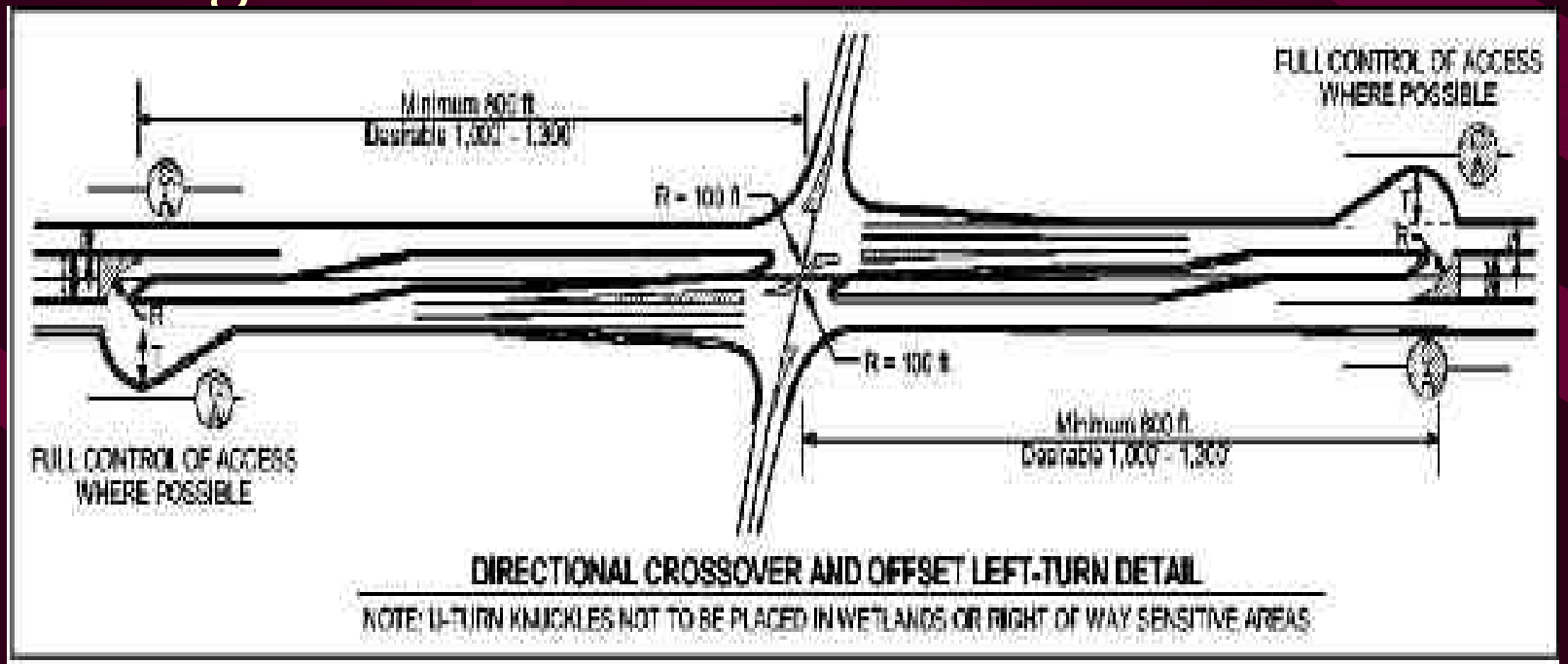
Basic Superstreet Intersection

- Left turn and side street through movements redirected
- 8 conflict points
- Only two signal phases, if needed; no more green arrows



Directional Crossovers with Median U-turns

- Reroute side street through and left-turn movements into one-way median openings
- Part of menu of unconventional arterial designs



Median Crossover with U-turns

- Allows leftover movement to side streets
- U-turn locations are allowed
- Truck bulbs provided as needed
- Side street through and left-turn movements rerouted through u-turn locations
- Signals are provided as warranted

US 1, Vass Bypass

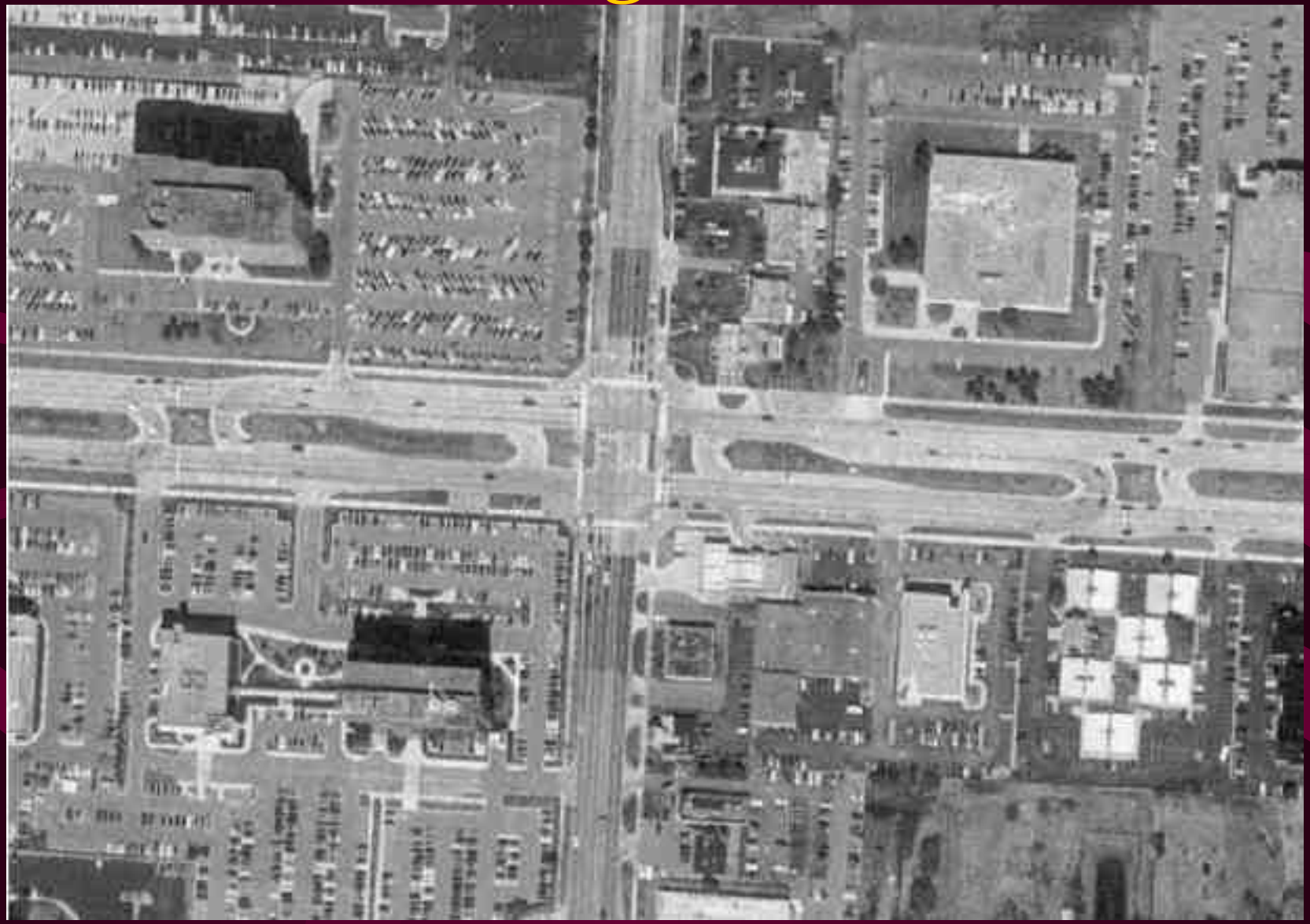
Peanut Road (Under Construction)

High Volume / Urban Areas

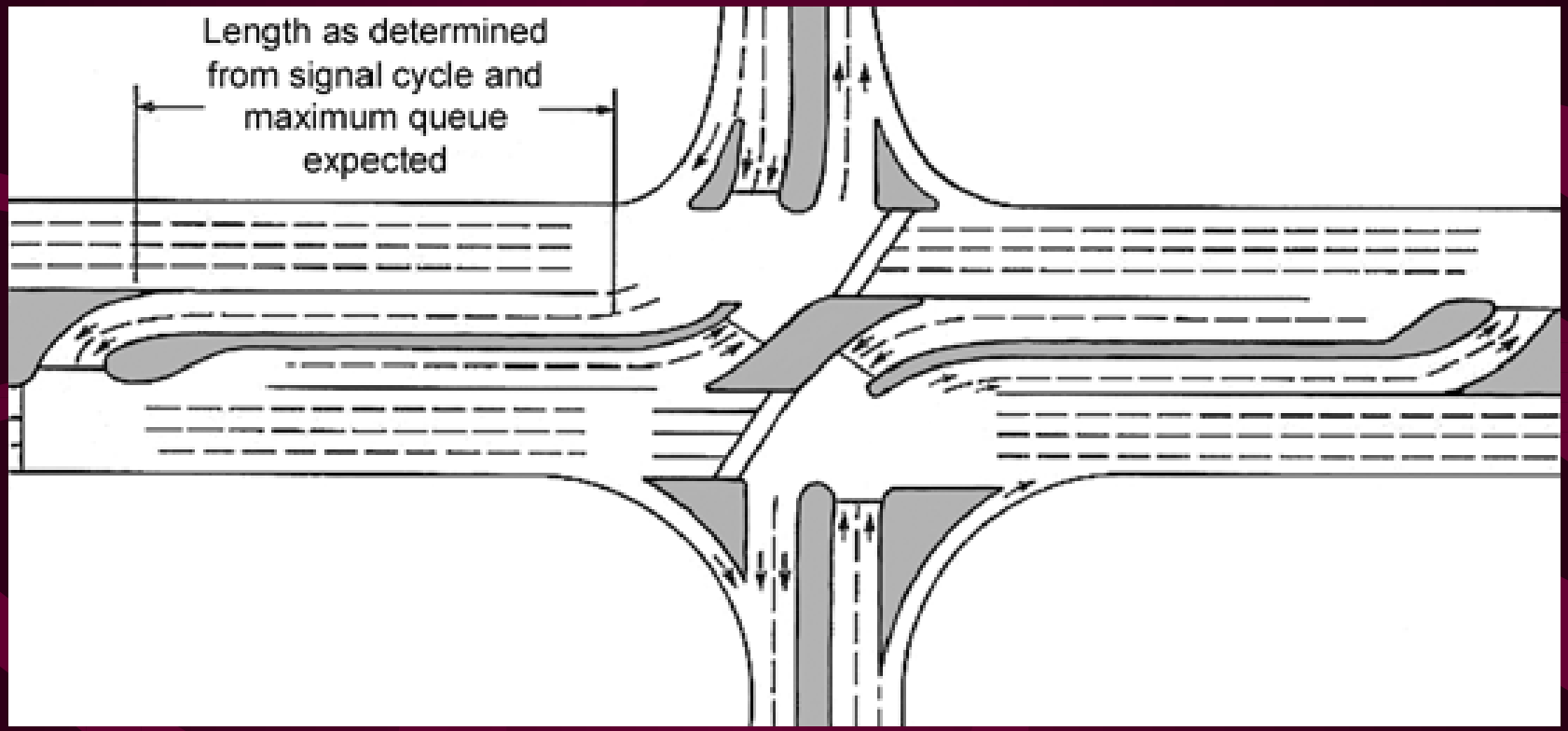
High Volume / Urban Areas

- Urban areas have multiple issues
- Safety due to congestion
- Capacity and Congestion issues due to access and multiple phase signals

Michigan Lefts



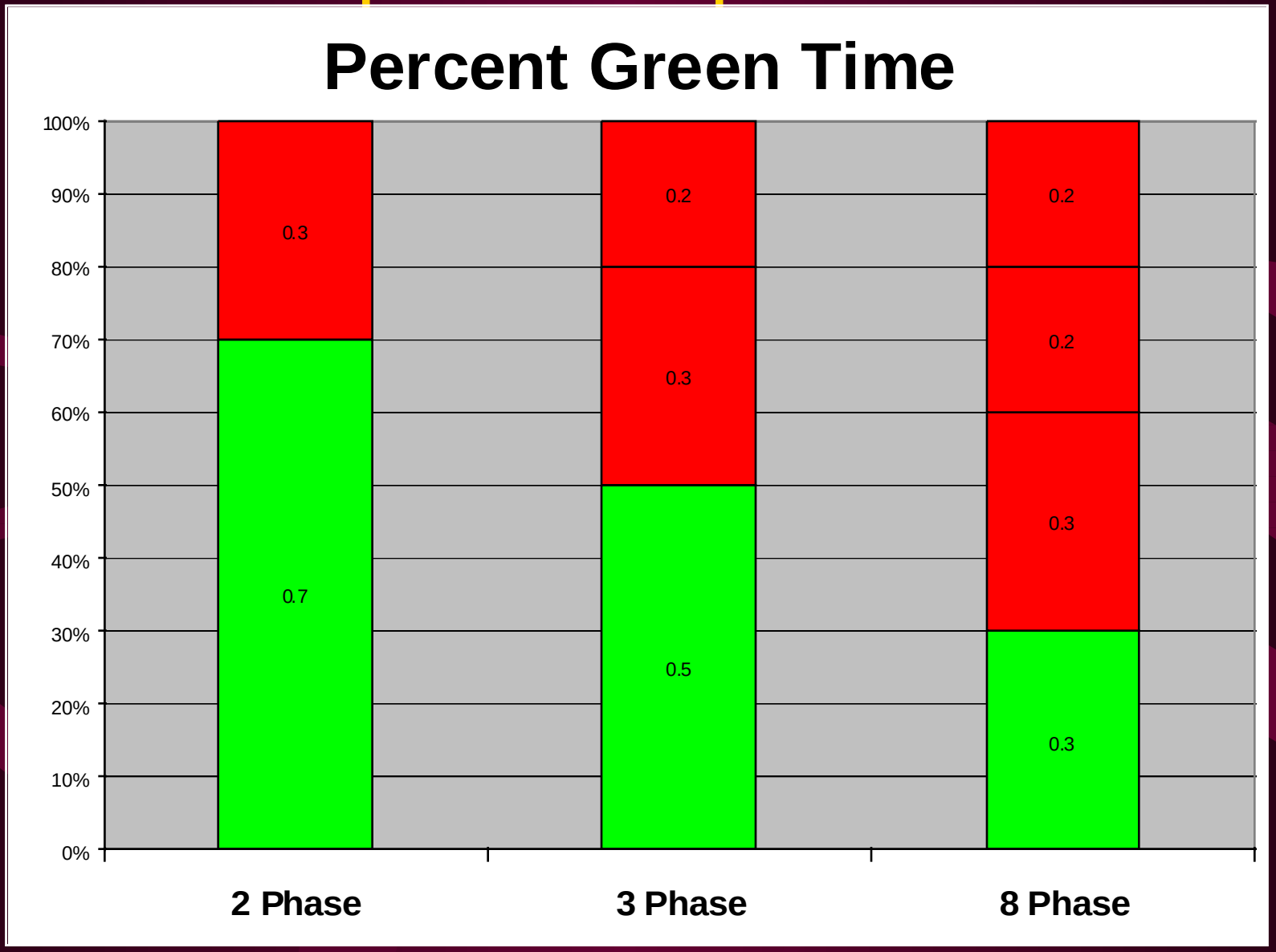
Super Superstreet



Advantages

- Great two-way progression
  - Improved Operations
    - Reduced delay and congestion, increased capacity, and improved emissions
  - Speed control
  - Improved emissions and fuel consumption
- Safety

Improved Operations



Improved Operations

DRAFT 11/01/05
Year 2007 US 17 VISSIM Results (Leland Area)

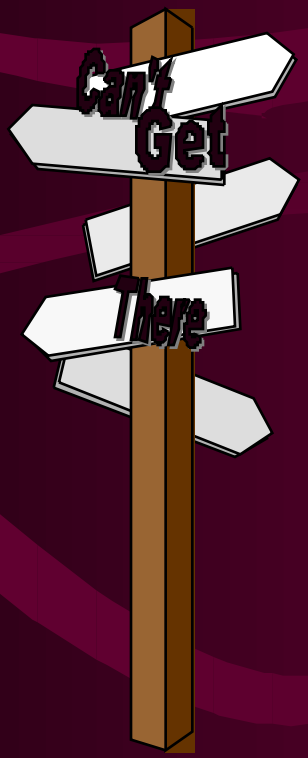
AM Peak	Intersections	Superstreet	Improvement
Thru Vehicle Delay (seconds/vehicle)	54	32	**41%**
Overall Vehicles in Network	3875	3909	--
Average Speed – all vehicles (mph)	27	30	11%
Average Speed – thru vehicles (mph)	30	43	**43%**
PM Peak	**Intersections**	**Superstreet**	**Improvement**
Thru Vehicle Delay (seconds/vehicle)	63	38	**40%**
Overall Vehicles in Network	4903	5051	--
Average Speed – all vehicles (mph)	24	29	19%
Average Speed – thru vehicles (mph)	34	41	21%

Safety

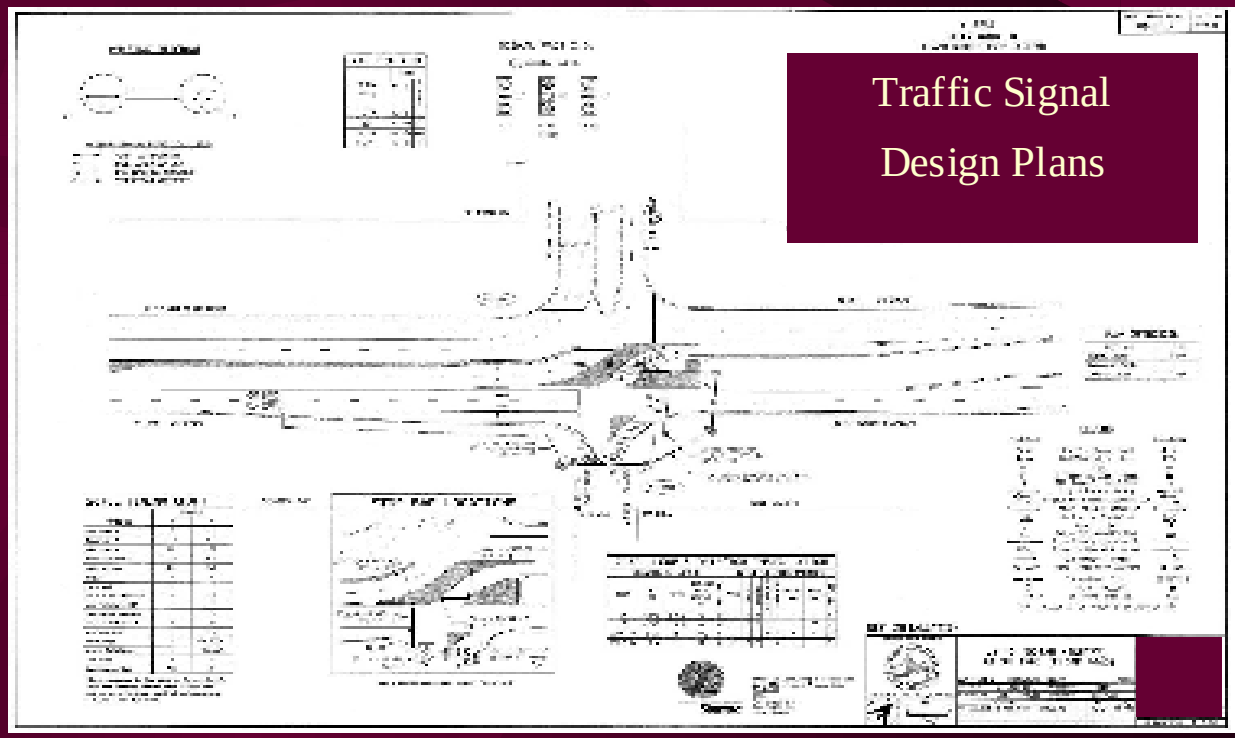
- Extensive research on Florida arterials showed right turns followed by U-turns are much safer than left-turns from side streets or driveways
- Recent research in North Carolina found very few collisions are caused by U-turns on main streets with medians
- Recent national research has indicated that access management strategies that increase U-turn volumes at unsignalized intersections can be used safely and effectively

Still Learning

Driver Awareness



Standards??



Source: Stantec

Sensory Overload

References

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Joseph Hummer, Robert Foyle, and Joseph Milazzo, "Effects of Increased U-Turns at Intersections on Divided Facilities and Median Divided versus Five-Lane Undivided Benefits," August 2004.

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John Lu, et al., "Safety Evaluation of Right Turns Followed by U-turns as an Alternative to Direct Left Turns - Conflict Analysis, October, 2001.